

PRODUCT EXAMPLES



OKAZAKI

MANUFACTURING COMPANY

<http://www.okazaki-mfg.com>

Outline of OKAZAKI



Company Name : OKAZAKI MANUFACTURING COMPANY

Head office : 1-3,Gokodori,3-Chome,Cyuo-Ku Kobe,651-0087,Japan

Established : January 26,1954

Line of business : Temperature measuring sensors , Industrial heaters
and Mineral insulated cable

Domestic factories : Akashi,Kobe-Iwaoka,Kobe-Nishi,Fukuoka and Kyusyu

International group companies :

ARi Industries, Inc.(USA)

Okazaki Manufacturing (Taiwan) Co.,Ltd

Okazaki Manufacturing Co.,European Office

OKAZAKI'S achievement in FY 2008 :

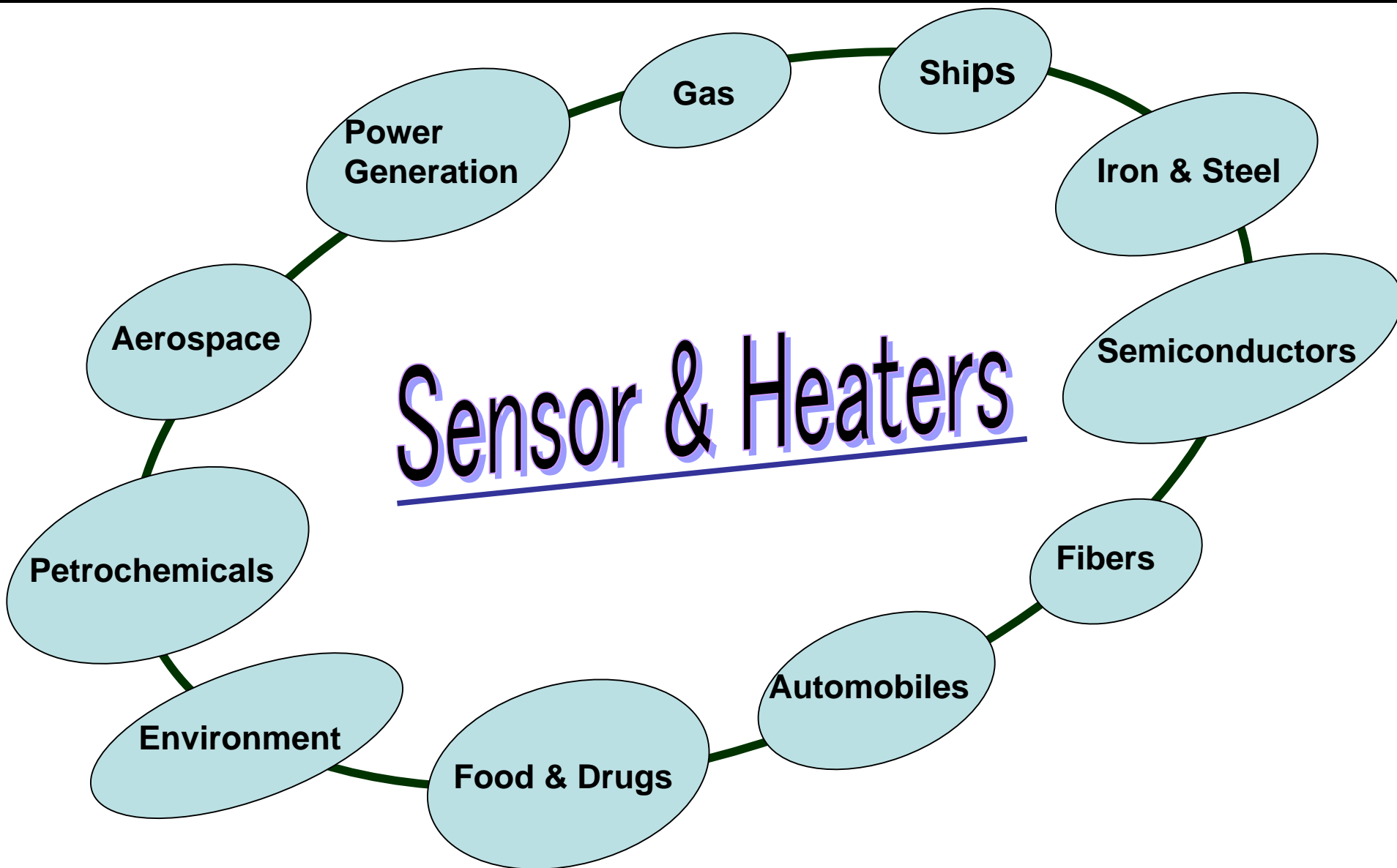
OMC only : \$130.0 million

OMC group consolidated:\$189.0 million

To all industrial fields



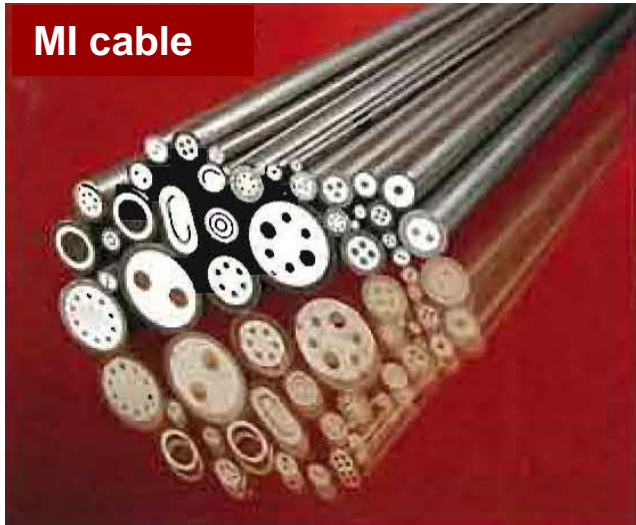
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Temperature sensor & Electrical heater for general use



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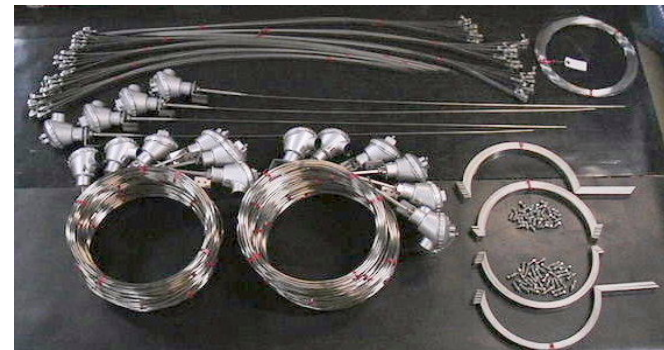
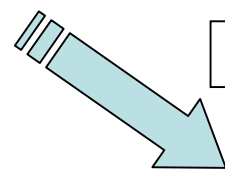
MI cable

**Core:
Ni,Ni-Cr Alloy or Others**



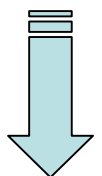
Thermocouples

Core : Ni-Cr Alloy or Others



Electrical Heaters

Core : Nickel or Copper



Supplied with Temperature Transmitter

Resistance Temperature Detectors



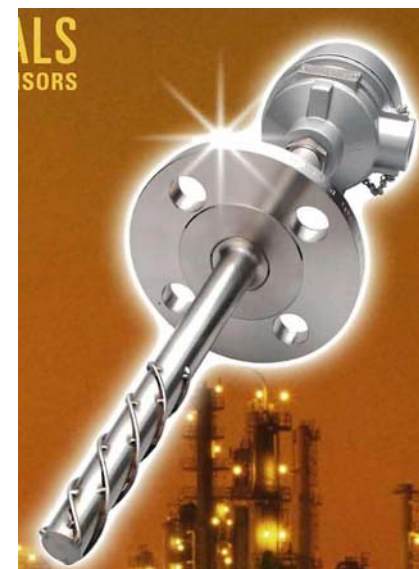
Temperature sensor for special use(1/2)



Temperature Sensor for Low Temperature Storage Tank(LNG,LPG)



Explosion/ Frame Proof Temperature Sensor



Temperature Sensor for Petrochemicals



Temperature Sensor for Nuclear use

Temperature sensor for special use (2/2)



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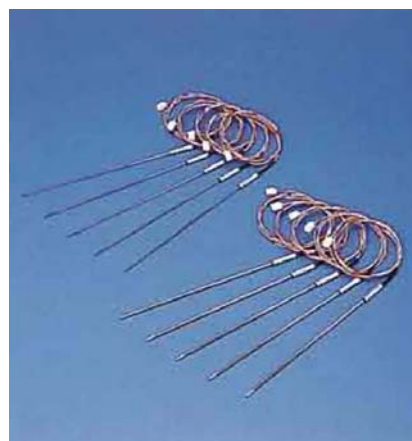
Sheath diameter (mm)	0.08	0.10	0.15	0.25
Insulation resistance	>1M Ω / 3VDC			>10M Ω / 50VDC
Response time (RT→Boiling water, 63.2%)	<1ms	1ms	2ms	4ms
Maximum temperature	400°C			500°C

Usable up to 1000°C for short-period use (Disposable Type)

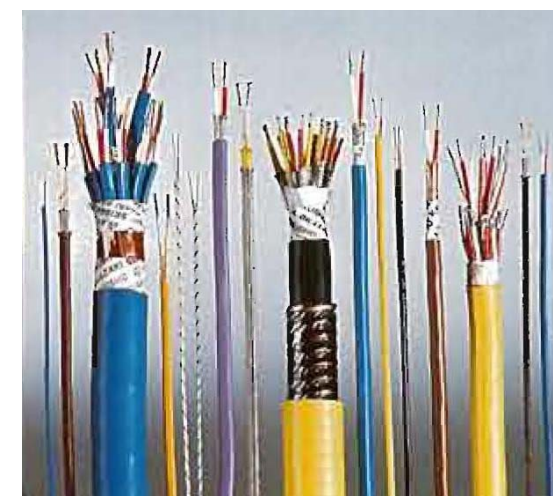
The World's smallest diameter
mineral insulated thermocouples



Thermocouples for high temperature:
2200°C (max)



Thermocouples for fuel cell



Compensating & Lead Wire

Electrical heaters



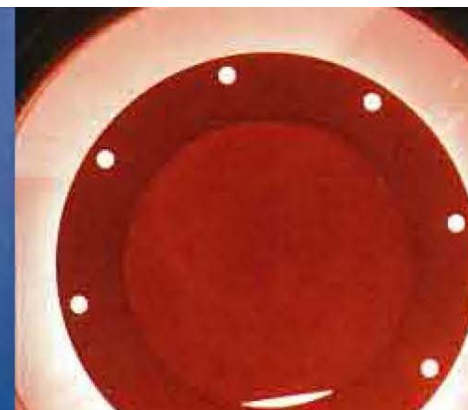
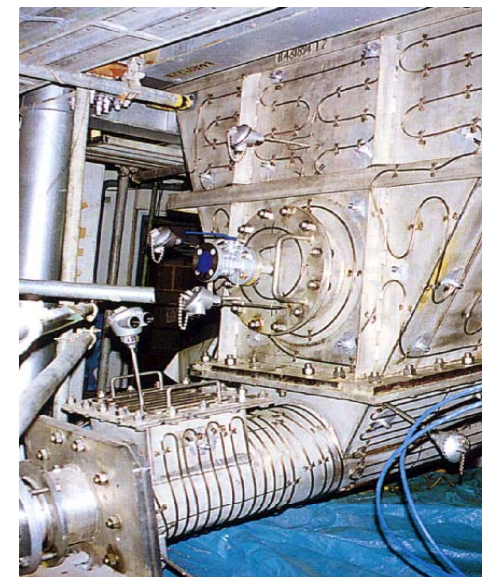
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Nuclear fuel rod simulation heaters



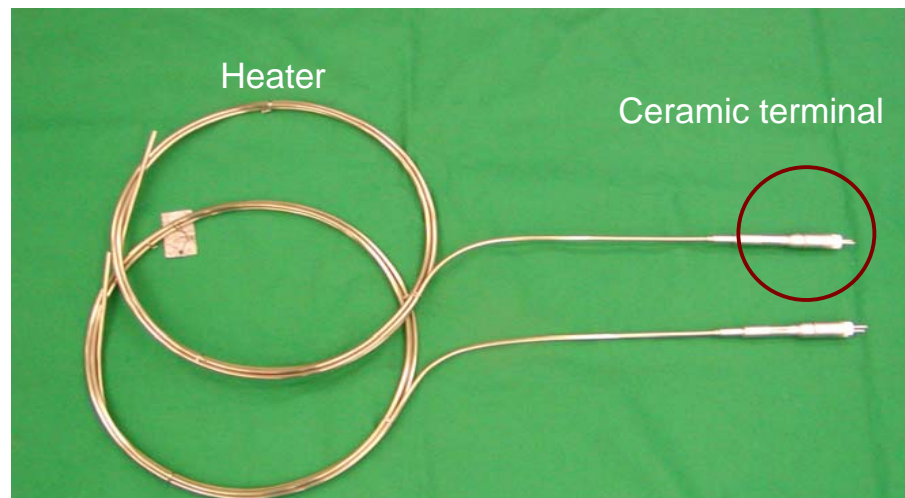
Micro -Heater Assembly



The temperature is rising at 600°C

High temperature plate heater for semiconductors

Baking heaters for vaccum chamber



Double element Type



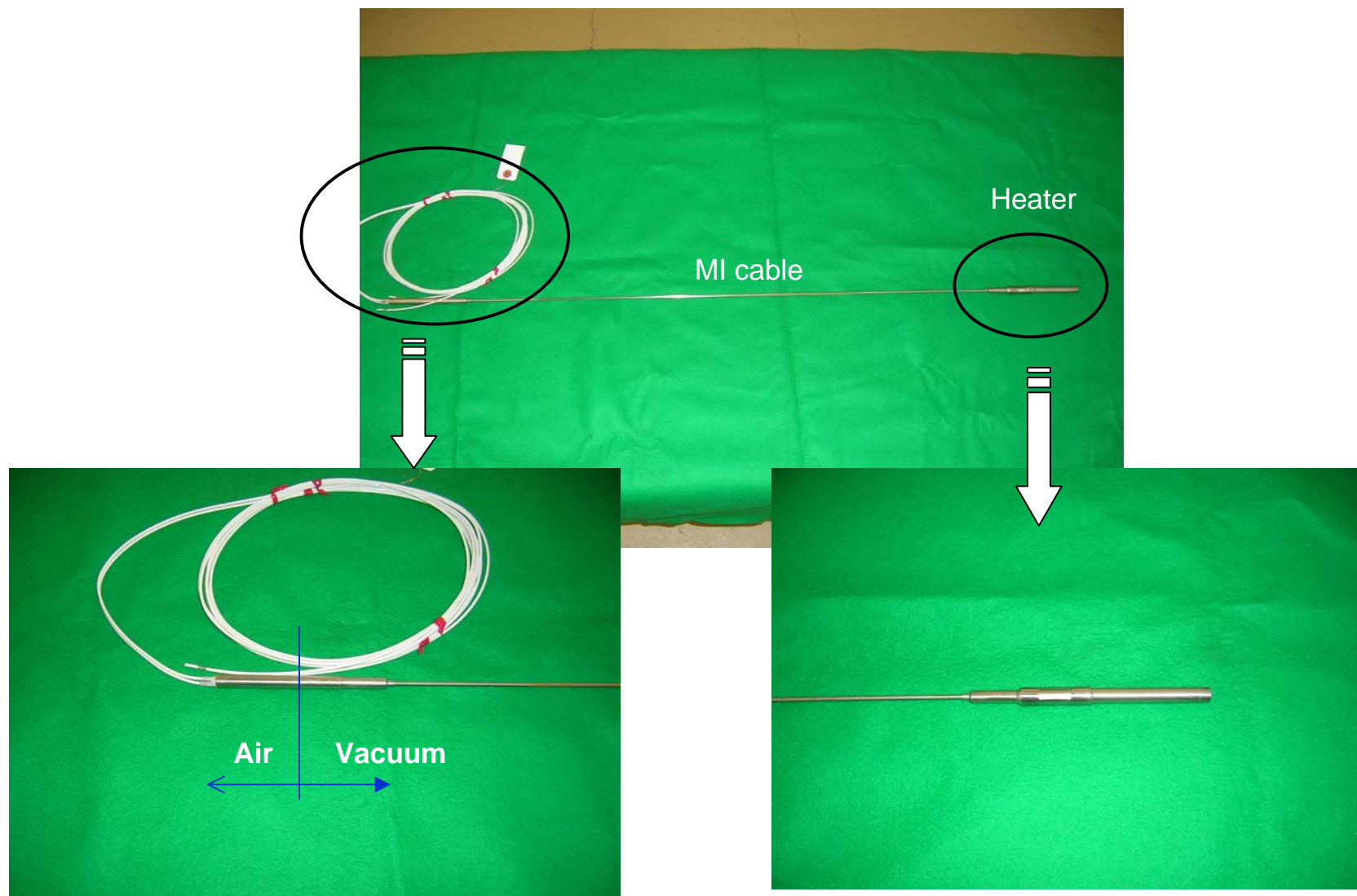
Single element Type

Ceramic terminal is used at end of the heater, and it is connectable to power supply in vaccum atmosphere

Cartridge heaters



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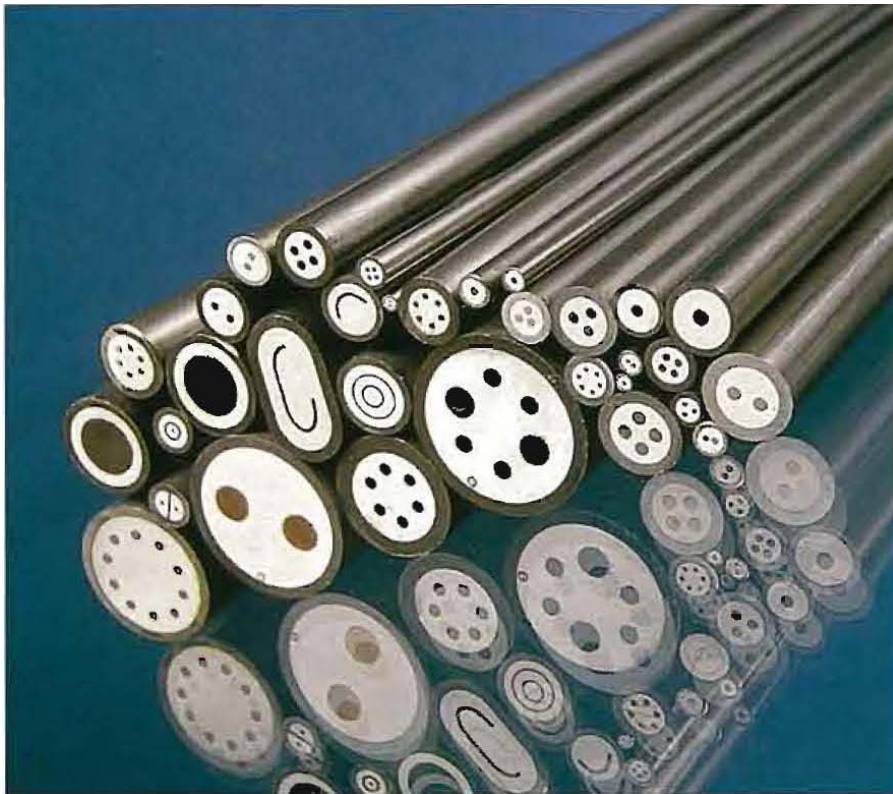


Power could be supplied to cartridge heater in the high temperature atmosphere or vacuum atmosphere if MI cable is connected to cartridge heater. (Self-contained termocouple is also available)

Introduce of Mineral Insulated cable



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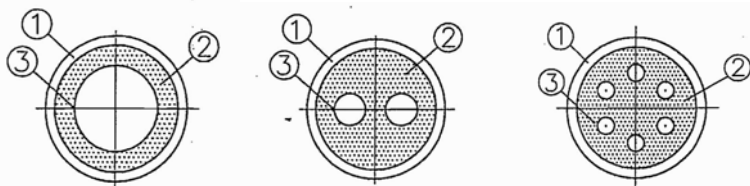


We can design and manufacture MI cable for heater, thermocouple and extension wire in response to various request from customer.

Typical MI cable for power, control & Instrumentation



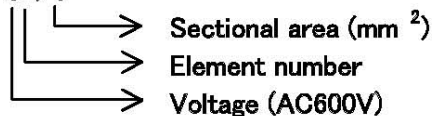
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1	Sheath	316ss or Others
2	Insulation	MgO
3	Element	Cu

Model	Conductor number	Sheath diameter (mm)	Conductor		Nominal wall thickness (mm)	Conductor resistance (Ω /km: at 20°C)	Dielectric strength value (VAC)	Insulation distance (mm)	Approx. Mass (g/m)	Standard length (m)
			Sectional area (mm ²)	Diameter (mm)						
MI- 61/4	1	6.6	4	2.31	Approx.12% of sheath O.D.	4.51	2500	Not less than 1.30	195	111
MI- 61/6		7.3	6	2.79		3.10			245	91
MI- 61/10		8.4	10	3.60		1.86			338	68
MI- 61/16		9.5	16	4.52		1.18			451	53
MI- 61/25		11.1	25	5.68		0.75			638	39
MI- 62/4	2	11.4	4	2.32		4.49			556	37
MI- 62/6		12.8	6	2.78		3.11			711	29
MI- 62/10		14.9	10	3.62		1.84			990	21
MI- 62/16		17.4	16	4.54		1.17			1378	16
MI- 62/25		20.3	25	5.66		0.75			1916	12
MI- 63/4	3	12.2	4	2.31		4.51			656	32
MI- 63/6		13.6	6	2.82		3.03			835	26
MI- 63/10		15.9	10	3.64		1.82			1177	19
MI- 63/16		18.4	16	4.54		1.17			1619	14
MI- 63/25		21.7	25	5.67		0.75			2305	10
MI- 64/4	4	13.4	4	2.30		4.55			801	28
MI- 64/6		15.1	6	2.86	2.94	1047	22			
MI- 64/10		17.6	10	3.65	1.80	1466	16			
MI- 64/16		20.5	16	4.53	1.17	2035	11			

Example : MI-61/4



Standard bend radius R = 6*D
(D: Sheath diameter)

Typical MI cable for thermocouple



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Model	Pair number	Sheath diameter D (mm)	Nominal wall thickness (mm)	Element diameter (mm)	Insulation resistance test (MΩ)	Sheath Material	Approx. Mass (g/m)	Standard length (m)
MI-□□-2□	1	0.25	0.035	0.05	> 100	316ss or Others	0.3	100
		0.5	0.08	0.1			1.2	180
		1.0	0.17	0.17			5	250
		1.6	0.27	0.27			10	100
		3.2	0.47	0.51			45	370
		4.8	0.72	0.76			100	160
		6.4	0.93	1.0			180	90
		8.0	1.16	1.3			280	60
MI-□□-4□	2	3.2	0.47	0.51			45	370
		4.8	0.72	0.76			100	160
		6.4	0.93	1.0			180	90
		8.0	1.16	1.3			280	60
MI-□□-6□	3	4.8	0.72	0.50			100	160
		6.4	0.93	0.72			180	90
		8.0	1.16	0.90			280	60

Model No.

MI-□□-□□

(Sheath Diameter D) × 100

Sheath material:

B: Inconel 600, C: 316ss, D: 310S ss, E: 321ss, F: 347ss

Element number

Element Type:

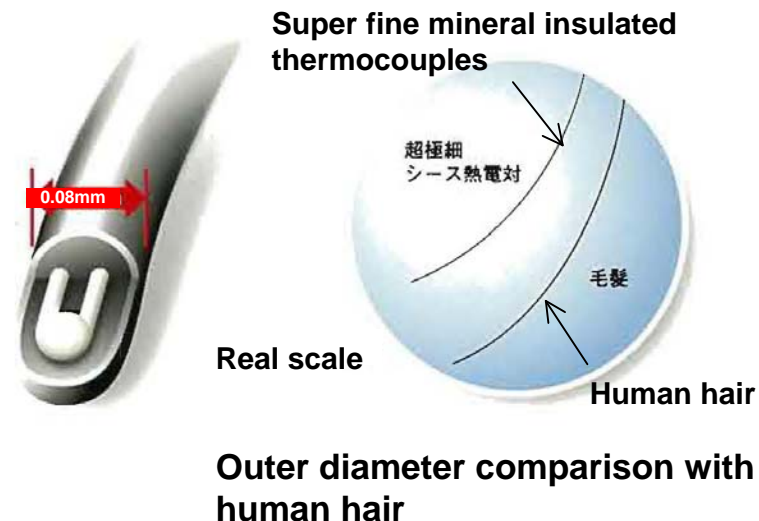
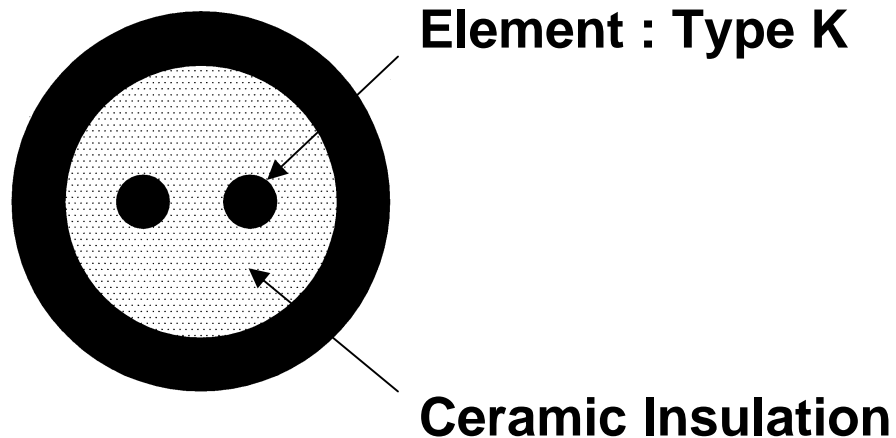
K, E, J, T or Others

• MI cable for thermocouple except shown on the above table are also available.

Ultra small diameter MI cable for thermocouples

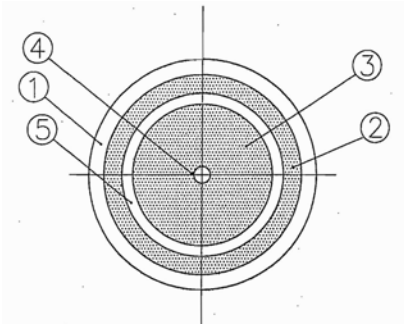


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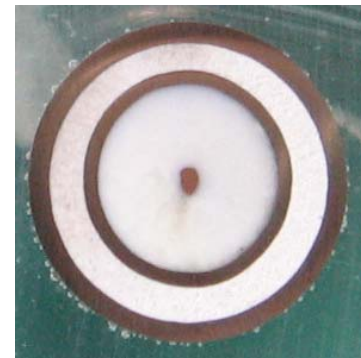


Model	Pair number	Sheath (mm)		Element diameter (mm)	Standard length (mm)	Sheath material
		Outer diameter	Wall thickness			
MI-008B-2K	1	0.08	0.011	0.011	200	Inconel 600
MI-010B-2K		0.10	0.014	0.014	300	
MI-015B-2K		0.15	0.020	0.020	500	

Actual achievement of manufacturing coaxial MI cable



1	Outer sheath	316ss or Others
2	Outer insulation	MgO
3	Inner insulation	SiO2
4	Element	Cu
5	Inner sheath	316ss or Others



Cross-sectional surface of coaxial cable

7C-2V Coaxial cable manufacturing results (Double stainless steel sheath)

Model	Element number	Conductor			Inner sheath			Outer sheath		
		Sectional area (mm ²)	Diameter (mm)	Resistance (Ω/km: at20°C)	diameter (mm)	wall thickness (mm)	Insulation thickness (mm)	diameter (mm)	Wall thickness (mm)	Insulation thickness (mm)
MI-7C2V	1	0.52	0.81	<45	7.8	0.52	2.97	11.0	0.73	0.87

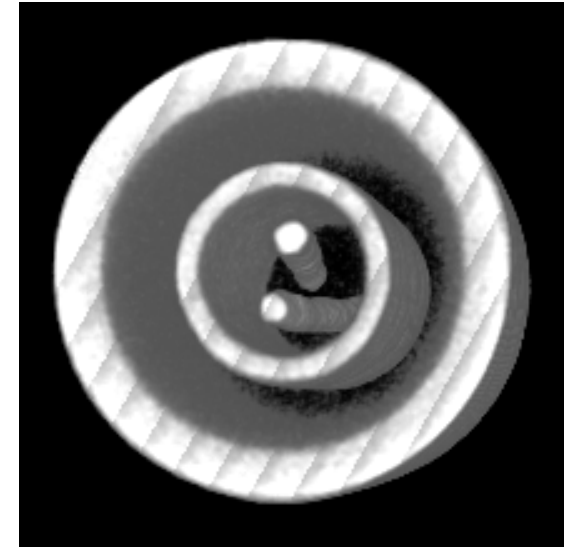
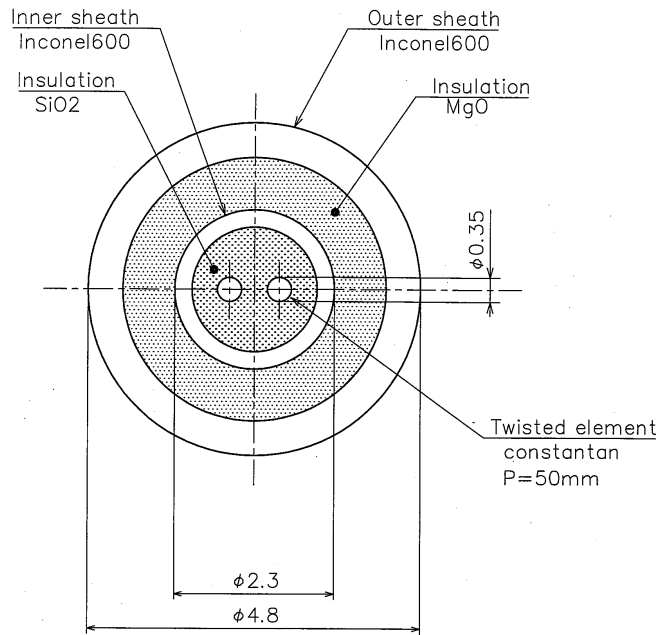
Model	Insulation resistance test (MΩ)	Capasitanc ^e (μF/km: at 1KHz)	attenuation amount (dB/km: at 10MHz)	Characteristic impedance (Ω)	Length (m) (Calculated value)
MI-7C2V	> 100	< 80	< 90	75±3	10

Standard bend radius R = 6*D
(D : Outer sheath diameter)

Double sheath twisted cable



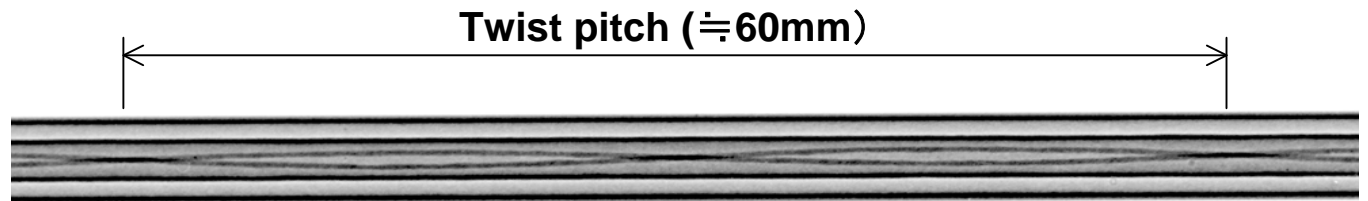
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MicroFocus Photo image



Cross sectional surface



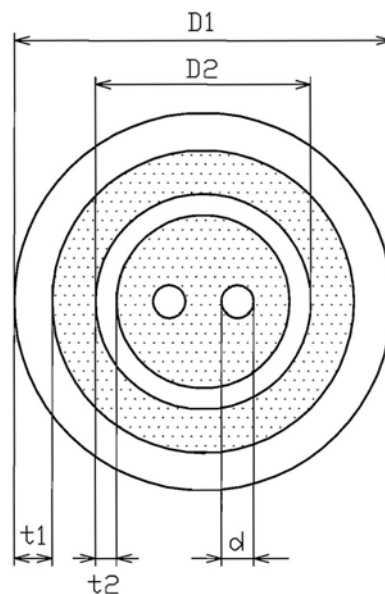
Inner X-ray photo

Multicore cable is also available based on customer's specification

Double sheath twisted cable (Continue)



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Explanation of symbol

Double sheath twisted cable

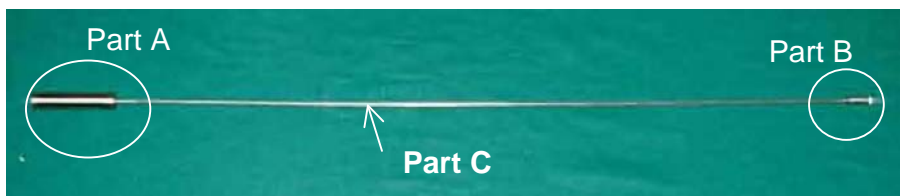
Outer sheath				Inner sheath						twisted pitch (mm)	Length (m) (Calculated value)	
Diameter D1(mm)	Sheath		Insulation material	Diameter D2 (mm)	Sheath		Insulation material	Conductor				
	Material	Wall thickness t1 (mm)			Material	Wall thickness t2 (mm)		Number	Diameter d (mm)			Material
6.4	316ss or Others	≥0.64	MgO or Others	3.65	316ss or Others	≥0.36	MgO or Others	2	≥0.55	Cu or Others	(50)	10
4.8		≥0.48		2.7		≥0.27			≥0.41		(50)	15
3.2		≥0.32		1.8		≥0.18			≥0.27		(100)	40

Standard bend radius R= 6*D1
(D1: Outer sheath diameter)

Probe for plasma magnetic fields measurement



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Magnetic probe

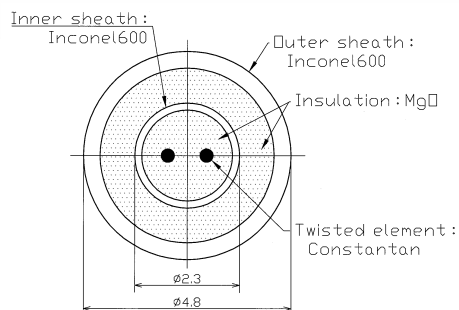
Part A : Sensing part



Part B : Voltage breaks



Inner X-ray Photo



Part C : Double sheath twisted cable

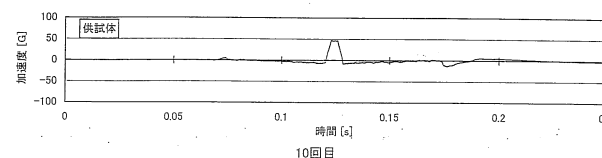
The sensor, which is one of the magnetic probes installed to fusion experimental reactor, is to detect component of magnetic field along wall of the vacuum vessel.

Specification

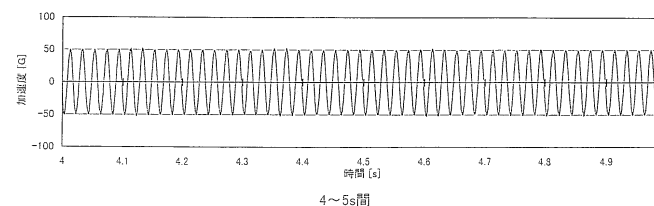
- Sensing part: $\phi 22 \times 108$ L
- Interlinkage products: 0.334 m^2 (10~1KHz, 0.8~5 Gauss)
- Heat proof temperature: 300°C
- Dielectric withstanding voltage: DC200V、1min

Characteristics:

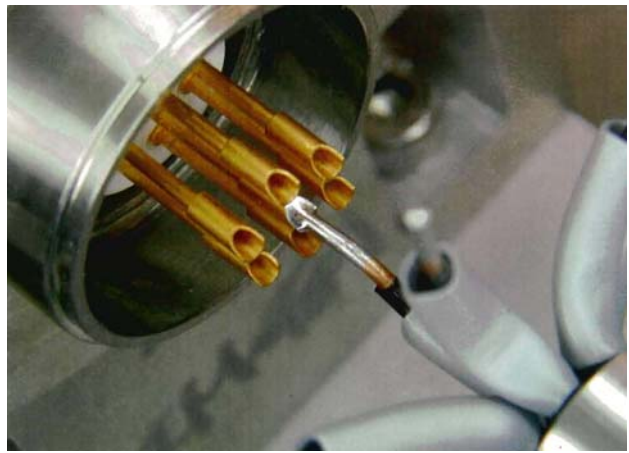
- Resistance to vibration occurs in magnetic field
- Impact resistance: 50G (trapezoidal wave 16ms, Repeat 10 times)



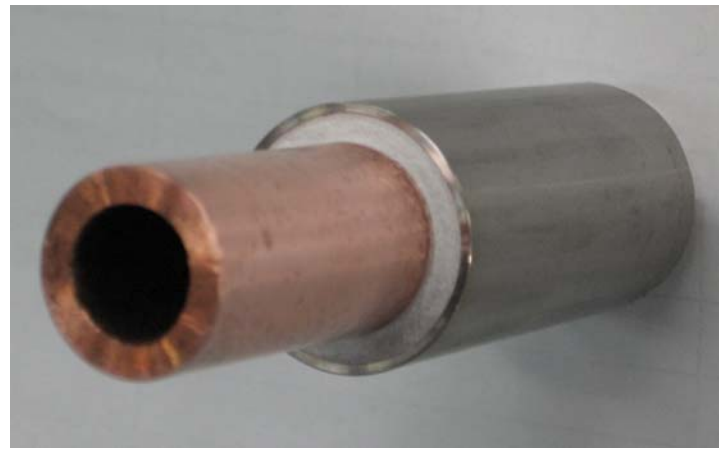
- Vibration resistance: 50G (Sine wave, 50Hz, Vibration time 5s, Repeat 10 times)



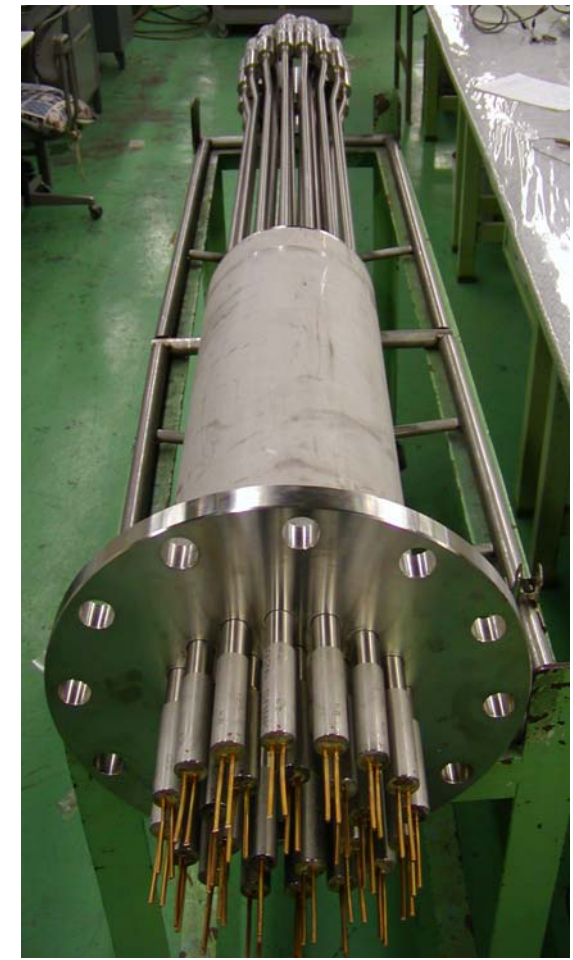
Usage example of MI cable



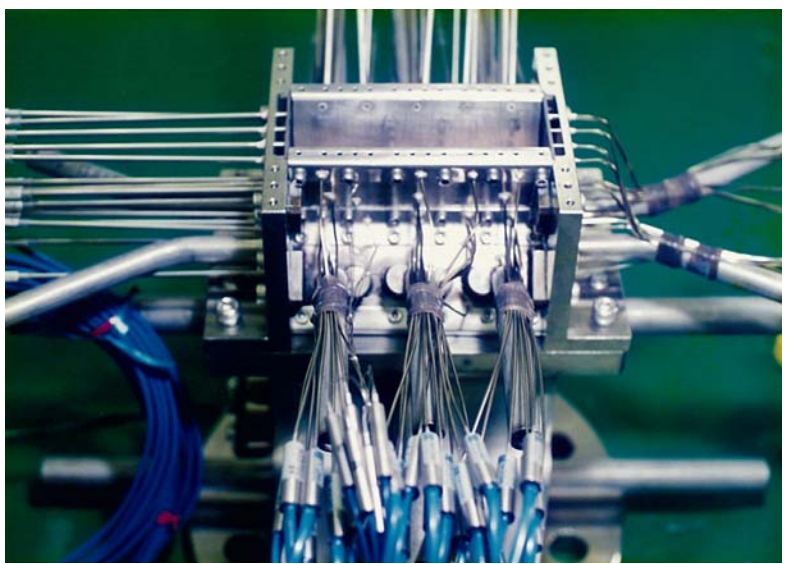
Connecting operation of MI cable and connector



MI cable with water-cooled tube



MI cable aggregate

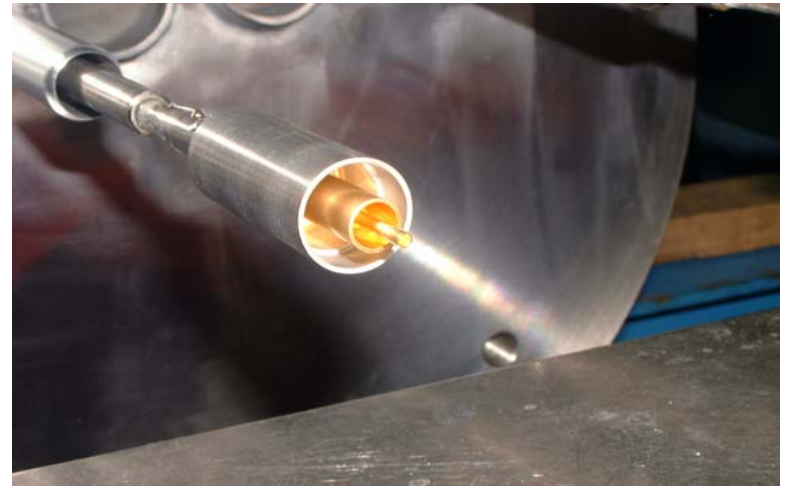


Temperature & pressure measuring experimental machine

Usage example of MI cable



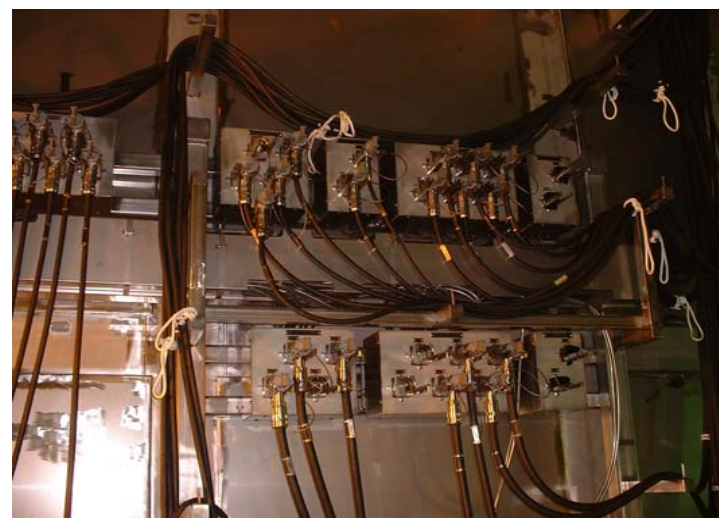
Coaxial cable in cell



7C2V Coaxial cable



Laying operation of MI cable which penetrates the wall



Connector box for MI cable



Plug for power manipulator

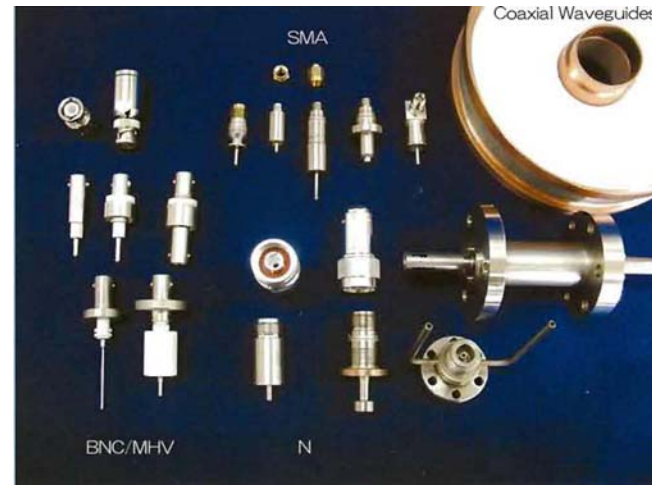
Connector & Feedthrough



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Multi pins & Connectors



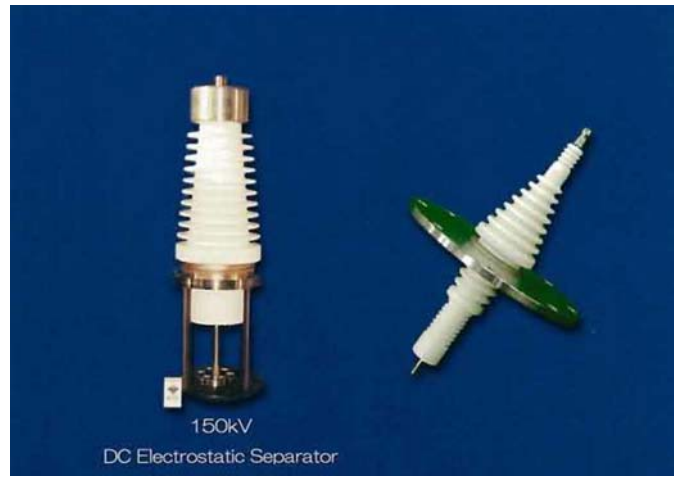
Coaxial feedthrough



Voltage breaks



Feedthrough for power supply



MI cable connectors

Connector & Feedthrough



For power supply



For power supply

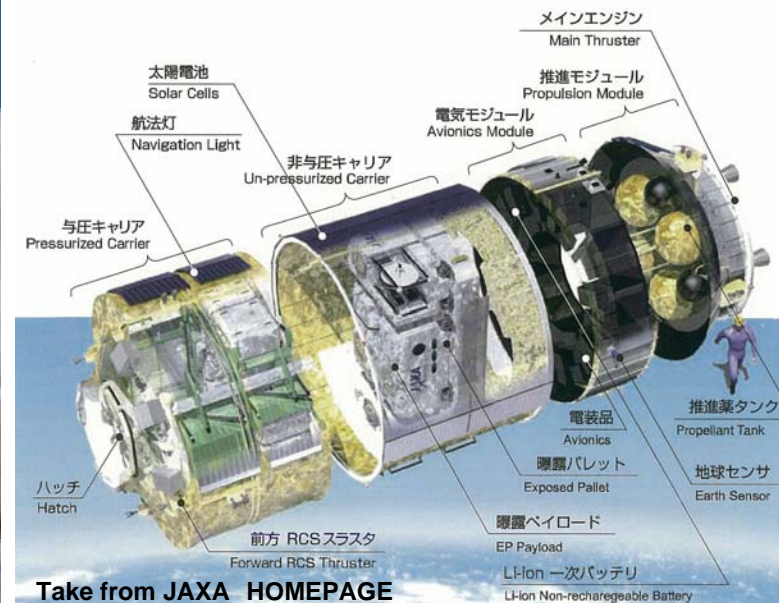


Voltage breaks

Temperature sensors for aerospace



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Sensor for aerospace instruments are manufactured in a clean room. They are installed in H- II A,H- II B rocket or satellites, and have excellent capabilities for measuring temperatures from -260°C to $+930^{\circ}\text{C}$,also,we manufactures liquid gas sensors that are mounted on rocket fuel tanks(LH₂,LO₂) in the H- II A, H- II B rocket.

Temperature Sensor for Aerospace

Temperature calibration system



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Temperature calibration system



Calibration range: 40 ~ 500°C
Stability: $\pm 0.1^\circ\text{C}$



Calibration range: 100 ~ 650°C
Stability: $\pm 0.05^\circ\text{C}$



Calibration range: 400 ~ 1000°C (1100°Cmax)
Stability: $\pm 0.05^\circ\text{C}$

We also carry temperature calibration devices (bath and dry-well type) of FLUKE

Environment and Quality control



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We are certified company of ISO 14001 & ISO 9001

We are committed to Green Procurement in order to eliminate hazardous chemical substance in our product.



**Awarded ISO 14001 for Environmental Management System
(Approval certificate No : YKA0772497)**

Approved factories : Akashi, Kobe-iwaoka



**Awarded ISO 9001 for Quality Management System
(Approval certificate No : YKA0925432)**

Approved factories : Akashi, Kobe-iwaoka, Fukuoka